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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,631	10/27/2003	Sylvia Couronne	REIN 102	8923

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EXAMINER	
DAGOSTA, STEPHEN M	

ART UNIT	PAPER NUMBER
2683	

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/693,631	COURONNE ET AL.	
	Examiner	Art Unit	
	Stephen M. D'Agosta	2683	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18 and 20-24* is/are rejected.

7)☒ Claim(s) *19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 May 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

Figures 1-8 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance. *The examiner believes that some of these drawings are prior art – please identify which drawings are embodiments of the invention and which are prior art.*

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 20 and 22-24 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The examiner is confused by the term "low cross correlation". Is it meant to mean a low probability of transmitting at the same time based upon the pseudo-random transmission timing OR does it have something to do with the type of data signal being used which has some sort of low cross correlation? For the purposes of examination, the examiner interprets it to be the former, ie. low probability of transmission collisions. Please clarify.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 7-11, 13-18, 20, 23-24 rejected under 35 U.S.C. 103(a) as being unpatentable over Wadell et al. US 6,204,813 and further in view of Scott et al. US 6,041,046.

As per **claims 1, 20, 23-24,** Wadell teaches a method for the continuous real time tracking of the position of a plurality of mobile objects in a defined multidimensional space (C4, L22-25), comprising:

attaching mobile transmitter modules to the mobile objects (C6, L20-22);

receiving signals from the transmitter modules by a station receiving and signal processing network (C5, L52-55); and

processing the received signals centrally (C5, L50-53),

wherein the signals emitted by transmitter modules are electromagnetic waves which are transmitted within a frequency band range utilizing a time division multiplexing technique (C7, L9-21 teaches various RF transmission technologies, including TDMA),

wherein an available frequency band is used as a single channel in order to maximize accuracy of position detection (C7, L9-21 teaches TDMA which typically uses one frequency band sub-allocated into slots supporting multiple users),

but is silent on wherein a communication process between transmitters in the transmitter modules and receivers of the receiving and signal processing network is based on a principle of pseudo-random time division multiplexing using non synchronized pseudo-random patterns, and

wherein the transmitters of the transmitter modules emit transmission signals in burst transmissions that are characterized by a low cross correlation.

Wadell does teach (C7, L9-21) combinations of the various RF transmission techniques can be used, ie. TDMA, FDMA and CDMA. Wadell also states that the combination would uses a 2.4GHz carrier, eg. single channel, modulated with a PRN code. Also see C7, L22-37 which discloses use of one-or-more channels and listening during the appropriate time slot for each object's transmission).

Scott teaches a TDMA system that uses a pseudo-random pattern to transmit sub-channels which "breaks up the otherwise strict periodicity of TDMA bursts, and to produce a more noiselike spectrum.....thereby reducing the level of interfering spectral components (Abstract). Also see figure 6 and C2, L13-64.

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that a communication process between transmitters in the transmitter modules and receivers of the receiving and signal processing network is based on a principle of pseudo-random time division multiplexing using nonsynchronized pseudo-random patterns and wherein the transmitters of the transmitter modules emit transmission signals in burst transmissions that are characterized by a low cross correlation, to provide means for reducing noise of interfering spectral components from a TDMA transmission source.

As per **claim 2,** Wadell teaches claim 1, **but is silent on** wherein the principle of pseudo-random time division multiplexing comprises a process of transmitting at isolated, irregular time points, whereby each transmitter uses a different pseudo-random sequence for the transmitting time point.

Scott teaches a TDMA system that uses a pseudo-random pattern to transmit sub-channels which "breaks up the otherwise strict periodicity of TDMA bursts, and to produce a more noiselike spectrum.....thereby reducing the level of interfering spectral components (Abstract). Also see figure 6 and C2, L13-64.

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that the principle of pseudo-random time division multiplexing

comprises a process of transmitting at isolated, irregular time points, whereby each transmitter uses a different pseudo-random sequence for the transmitting time point, to provide means for reducing noise of interfering spectral components from a TDMA transmission source.

As per **claim 3,** Wadell teaches Claim 1, **but is silent on** wherein the receivers estimate the time point of the next burst transmission from a certain transmitter based on the pseudo-random time division multiplexing and the pseudo-random pattern.

Scott teaches a TDMA system that uses a pseudo-random pattern to transmit sub-channels which "breaks up the otherwise strict periodicity of TDMA bursts, and to produce a more noiselike spectrum.....thereby reducing the level of interfering spectral components (Abstract). Also see figure 6 and C2, L13-64. The examiner notes that the term "pseudo-random" means that it is a repeating function and hence both ends of the communication path will know the repeating pattern.

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that the receivers estimate the time point of the next burst transmission from a certain transmitter based on the pseudo-random time division multiplexing and the pseudo-random pattern, to know when it is the next piece of data will be transmitted.

As per **claim 4,** Wadell teaches Claim 3, **but is silent on** wherein only those signals are evaluated by the receiving and signal processing network which arise at the predetermined time point of the next burst transmission.

Scott teaches a TDMA system that uses a pseudo-random pattern to transmit sub-channels which "breaks up the otherwise strict periodicity of TDMA bursts, and to produce a more noiselike spectrum.....thereby reducing the level of interfering spectral components (Abstract). Also see figure 6 and C2, L13-64. The examiner notes that the "pseudo-random" pattern will allow transmitter and receiver to know when a new transmission is to occur and only look for data at that time, hence all other data received will be ignored.

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that only those signals are evaluated by the receiving and signal processing network which arise at the predetermined time point of the next burst transmission, to provide means for noise reduction (ie. by not processing data received at specific times).

As per **claim 5,** Wadell teaches Claim 3, **but is silent on** wherein the next burst transmission from the certain transmitter is determined continuously.

Scott teaches a TDMA system that uses a pseudo-random pattern to transmit sub-channels which "breaks up the otherwise strict periodicity of TDMA bursts, and to produce a more noiselike spectrum.....thereby reducing the level of interfering spectral components (Abstract). Also see figure 6 and C2, L13-64. The examiner notes that Scott's figure 6 shows how/when each transmitter/receiver continuously determines the transmission/receive times (as a continuous pseudo random repeating function).

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that the next burst transmission from the certain transmitter is determined continuously, to keep transmitters and receivers in synchronization.

As per **claim 7,** Wadell teaches Claim 1, wherein the frequency band range lies at approximately 2.4 GHz (C7, L18-21).

As per **claim 8,** Wadell teaches Claim 1 **but is silent on** wherein the frequency band range has a bandwidth of 80 MHz.

Wadell teaches the receiving towers having a bandpass filter to filter out noise in order to correctly receive the data (C7, L28-46). One skilled would build a bandpass filter such that a large amount of the 2.4GHz spectrum is retained (eg. tens or hundreds of Kilohertz or Megahertz. ***Also see C7, L55-59 which describes Megahertz region***).

The examiner takes **Official Notice** that bandpass filters are known in the art and can be designed to accommodate virtually any passable frequency range based on the carrier frequency.

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that the frequency band range has a bandwidth of 80 MHz, to provide means for using a large portion of the bandwidth transmitted on the 2.4GHz carrier.

As per **claim 9,** Wadell teaches Claim 1, wherein the receiving and signal processing network comprises stationary reference transmitters that are used as position references for the purposes of minimizing errors and for calibration of the positions of the transmitter modules (figure 1 shows four receive towers, each marked as #12-14), said reference transmitters transmitting an identification code in a sequence (C2, L8-10 teaches each tower using a unique PN-coded sequence being assigned to each transmitter which reads on an identification code), the signals from said reference transmitters being detected by receivers of the receiving and signal processing network for purposes of determining their time of arrival at the respective receivers (C3, L59 to C4, L5 teaches receiving data from each player and determining it's identity and TOA).

As per **claim 10,** Wadell teaches Claim 9, wherein the reference transmitters are synchronized over cables (C4, L6-8 teaches the towers being connected to the main locating system via cables, ie. Ethernet and fiber optic).

As per **claim 11,** Wadell teaches Claim 1, wherein the burst transmissions are sent utilizing non synchronized pseudo-random patterns which are a combination of access mechanisms, time division multiplexing, and code division multiplexing (C7, L9-21 teaches combining RF transmission techniques such as TDMA, FDMA and CDMA).

As per **claim 13,** Wadell teaches Claim 1 wherein in the case of the burst transmissions a separation of at least two signals of different origin arriving randomly at the same time is effected by a receiver of the receiving and signal processing network (Wadell's system can distinguish between the different players on the playing field based upon receiving data from each of the player's transmitters and processing their TOA's to determine player location, C3, L59 to C4, L8).

As per **claim 14,** Wadell teaches Claim 1, wherein the burst transmissions are transmitted at a pulse rate which is so high that undetected individual values are tolerated (applicant's specification states "...Due to the high pulse rate, the system can easily function without some individual values if these cannot be detected. Thus, in toto, high capacities of the system can be used for the transmission of signals for the navigation process):

Wadell teaches determining if errors have occurred (C9, L65 to C10, L3 and C11, L12-16 teaches using techniques such as least squares and weighting to overcome errors, which reads on the claim.

As per **claim 15,** Wadell teaches Claim 1, wherein non-synchronized burst transmissions from the transmitter modules are synchronized with the aid of receivers in the transmitter modules in order to reduce the probability of overlaps when there are many transmitter modules (Wadell teaches using TDMA, CDMA or FDMA and/or a combination of these, which would provide for synchronized transmissions).

As per **claim 16,** Wadell teaches Claim 1, wherein the receiving and signal processing network comprises means for receiving analog signals, digitizing the received signals, and determining and storing time points, at which the signals from respective transmitter modules are received (C3, L59 to C4, L8 teaches RF/analog transmission of data to a computer (eg. digital) for processing).

As per **claim 17,** Wadell teaches Claim 1, wherein different algorithms can be used by the receiving and signal processing-network for the processing of received and stored signals in different situations (C11, L59-67 teaches using the data in various applications/algorithms to calculate various game-specific parameters such as impact, yards gained, quickness, speed around the bases, vertical leap, etc., which reads on the claim. Also see C12, L12-23 which provides other situations in which to use Wadell's system).

As per **claim 18,** Wadell teaches Claim 17, wherein the receiving and signal processing network comprises means for dividing received signals into sections for processing of the received signals, and the best respective algorithm or a plurality of algorithms are used simultaneously for the individual sections (C11, L59 to C12, L23 teaches various different situations for which to use the received data. The application processor shown in figure 1, #28 inherently has memory to store the received data in virtually any way necessary, eg. in a database. One skilled realizes that each way in which Wadell's system is used will generate specific data, hence said data will be stored accordingly).

Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Wadell/Scott and further in view of Horchler US 3,782,739.

As per **claim 6,** Wadell teaches Claim 1, **but is silent on** wherein the transmitter modules are miniaturized, at least one of the transmitter modules being small enough to be inserted into a ball.

Horchler teaches a transmitter inserted into a golf ball (abstract, figures 1-2 and and C1, L1 to C2, L12).

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that the transmitter modules are miniaturized, at least one of the transmitter modules being small enough to be inserted into a ball, to provide means for tracking an inanimate object such as a sports ball.

Claim 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Wadell/Scott and further in view of Yokev et al. US 5,583,517.

As per **claim 12,** Wadell teaches Claim 1 **but is silent on** wherein the pseudo-random patterns are Prime number Sequences.

Scott teaches a TDMA system that uses a pseudo-random pattern to transmit sub-channels (Abstract). Also see figure 6 and C2, L13-64. The examiner notes that a "pseudo-random" appears to be a non-repeating pattern but actually is.

Yokev teaches using prime number sequences to ensure irregular spacing of antennas to increase the probability of a phase difference. The examiner also notes that one skilled would use this same approach, ie. using prime number sequences, to genenate the PRN patterns to ensure that there are differences in the data transmission times:

As seen from FIG. 5, the three antenna 501, 502 and 503 are irregularly spaced such that distance D.sub.23 between antennas 501 and 502 is great than distance D.sub.12 between antennas 502 and 503. The distance between the antennas is selected to be a multiple of a prime number sequence to ensure an irregular spacing of all antennas in the array which increases the probability that an electrical phase difference will always be measured between some of the antenna members of the array. (C15, L19-27).

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that the pseudo-random patterns are Prime number Sequences, to ensure irregular spacing of the PRN patterns.

Claims 21 and 22 rejected under 35 U.S.C. 103(a) as being unpatentable over Wadell/Scott and further in view of Holt US 2002/0196186.

As per **claim 21,** Wadell teaches Claim 20, **but is silent on** further comprising reference transmitters that receive trigger and clock pulse signals from the receiving and signal processing network.

Holt discloses (Paragraph #0005) "...Some prior art systems use external calibration techniques to correct clock offsets and to correct for other variations in the receivers that may introduce TOA (and, therefore TDOA) measurement errors or errors in other

measured parameters such as frequency of arrival (FOA). In these systems, receivers at known locations measure certain parameters of a signal transmitted by a stationary reference transmitter at a known location. The measured parameters are then communicated to a common point where a processor calculates offsets or adjustments that are either used to adjust one or both of the receivers or are applied to the time difference of arrival (TDOA) and/or frequency difference of arrival (FDOA) calculations…."

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that reference transmitters that receive trigger and clock pulse signals from the receiving and signal processing network, to provide a reference source within the network for comparison purposes.

As per **claim 22,** Wadell teaches a method for the tracking of the position of a mobile object (C4, L22-25), comprising:

attaching mobile transmitter module to the mobile object (C6, L20-22);

receiving signals emitted by the transmitter modules with a plurality of receivers (C5, L52-55, C7, L9-21 teaches various RF transmission technologies, including TDMA),

wherein an available frequency band is used as a single channel in order to maximize position detection (C7, L9-21 teaches TDMA which typically uses one frequency band sub-allocated into slots supporting multiple users),

but is silent on

placing at least one reference transmitter module at at least one known position;

wherein a communication process between receivers and the transmitters modules is based on a principle of pseudo-random time division multiplexing using non synchronized pseudo-random patterns, and

wherein the transmitter modules emit transmission signals in burst transmissions that are characterized by a low cross correlation.

Wadell does teach (C7, L9-21) combinations of the various RF transmission techniques can be used, ie. TDMA, FDMA and CDMA. Wadell also states that the combination would uses a 2.4GHz carrier, eg. single channel, modulated with a PRN code. Also see C7, L22-37 which discloses use of one-or-more channels and listening during the appropriate time slot for each object's transmission).

Holt discloses (Paragraph #0005) "...Some prior art systems use external calibration techniques to correct clock offsets and to correct for other variations in the receivers that may introduce TOA (and, therefore TDOA) measurement errors or errors in other measured parameters such as frequency of arrival (FOA). In these systems, receivers at known locations measure certain parameters of a signal transmitted by a stationary reference transmitter at a known location. The measured parameters are then communicated to a common point where a processor calculates offsets or adjustments that are either used to adjust one or both of the receivers or are applied to the time difference of arrival (TDOA) and/or frequency difference of arrival (FDOA) calculations…."

Scott teaches a TDMA system that uses a pseudo-random pattern to transmit sub-channels which "breaks up the otherwise strict periodicity of TDMA bursts, and to produce a more noiselike spectrum.....thereby reducing the level of interfering spectral components (Abstract). Also see figure 6 and C2, L13-64.

It would have been obvious to one skilled in the art at the time of the invention to modify Wadell, such that placing at least one reference transmitter module at at least one known position and wherein a communication process between receivers and the transmitters modules is based on a principle of pseudo-random time division multiplexing using non synchronized pseudo-random patterns and wherein the transmitter modules emit transmission signals in burst transmissions that are characterized by a low cross correlation, to provide references within the network for comparison purposes and to reduce interference within a TDMA transmission system.

Allowable Subject Matter

Claim 19 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

This claim recites limitations not found alone or in combination in the prior art of record. It recites "wherein the receiving and signal processing network comprises means for dividing received signals into sections for processing of the received signals, and a rotated time axis is also used for individual sections so that discontinuities in highly dynamic processes are approached from two sides".

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. Clegg et al. US 5,477,459
2. Singer et al. US 5,485,163
3. Wang US 5,912,644
4. Dunn et al. US 5,600,706
5. Green Jr. US 5,926,133
6. Menache US 6,831,603
7. Vock et al. US 6,093,923

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. D'Agosta whose telephone number is 571-272-7862. The examiner can normally be reached on M-F, 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Trost can be reached on 571-272-7872. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stephen D'Agosta
Primary Examiner
9-20-2005